DR. ZABDAWI **Derivatives of Trig. And Inverse Trig. Functions**

U is a function of x, i.e. U =U(x)

If $U = x \rightarrow \dfrac{dU}{dx} = 1$

Y	$\frac{dY}{dx}$
U^n	$nU^{n-1}\frac{dU}{dx}$
Trigonometric Functions	
$SinU$	$CosU\frac{dU}{dx}$
$CosU$	$-SinU\frac{dU}{dx}$
$SecU$	$SecU\ TanU\frac{dU}{dx}$
$TanU$	$Sec^2U\frac{dU}{dx}$
$CscU$	$-CscU\ CotU\frac{dU}{dx}$
$CotU$	$-Csc^2U\frac{dU}{dx}$
Inverse Trigonometric Functions	
$Sin^{-1}U$	$\frac{1}{\sqrt{1-U^2}}\frac{dU}{dx},\ \lvert U\rvert<1$
$Cos^{-1}U$	$\frac{-1}{\sqrt{1-U^2}}\frac{dU}{dx},\ \lvert U\rvert<1$
$Tan^{-1}U$	$\frac{1}{1+U^2}\frac{dU}{dx}$
$Cot^{-1}U$	$\frac{-1}{1+U^2}\frac{dU}{dx}$
$Sec^{-1}U$	$\frac{1}{U\sqrt{U^2-1}}\frac{dU}{dx},\ \lvert U\rvert>1$
$Csc^{-1}U$	$\frac{-1}{U\sqrt{U^2-1}}\frac{dU}{dx},\ \lvert U\rvert>1$

Dr. ZABDAWI

MATH 2460

Tabulation of Basic integrals

$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad , \quad n \neq -1$
$\int \frac{dx}{x} = \ln\lvert x\rvert + C$
$\int e^x dx = e^x + C$
$\int a^x dx = \frac{a^x}{\ln a} + c \quad , \quad a > 0, a \neq 1$
$\int \cos x dx = \sin x + C$
$\int \sin x dx = -\cos x + C$
$\int \sec^2 x dx = \tan x + C$
$\int \csc^2 x dx = -\cot x + C$
$\int \sec x \tan x dx = \sec x + C$
$\int \csc x \cot x dx = -\csc x + C$
$\int \tan x dx = \ln\lvert\sec x\rvert + C$
$\int \cot x dx = \ln\lvert\sin x\rvert + C$
$\int \sec x dx = \ln\lvert\sec x + \tan x\rvert + C$
$\int \csc x dx = \ln\lvert\csc x - \cot x\rvert + C$

Dr. ZABDAWI **Math 2460**

How to Evaluate $\int \sin^m x \cos^n x dx$

If the power of the sine is odd (m is odd) then:
Save one sine factor
Use $\sin^2 x = 1 - \cos^2 x$
Let $U = \cos x$

b) If the power of the cosine is odd (n is odd) then:
Save one cosine factor
Use $\cos^2 x = 1 - \sin^2 x$
Let $U = \sin x$

c) If the powers of both the sine and cosine are odd then:
Use either approach a) or approach b).

d) If the powers of both the sine and cosine are even then:
Use half angle identities: $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$, $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

$$\sin x \cos x = \frac{1}{2}\sin 2x$$

How to Evaluate $\int \tan^m x \sec^n x dx$

If the power of the tangent is odd then:
Save one factor of $\sec x \tan x$
Use $\tan^2 x = \sec^2 x - 1$
Let $U = \sec x$

b) If the power of the secant is even then:
Save one factor of $\sec^2 x$
Use $\sec^2 x = 1 + \tan^2 x$
Let $U = \tan x$

c) If the power of the tangent is odd and the power of the secant is even then:
Use either approach a) or b).